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ABSTRACT

A research project was designed 1) to compare student-controlled to program-controlled computer-assisted instruction (CAI); and 2) to evaluate the effect of reading a lesson narrative before training. A 2x2 design was used to investigate the influence of the two pretraining and two training conditions on performance scores and training time. Ninety-six trainees in a Navy Basic Electricity/Electronics School course were randomly assigned among the four treatment groups and completed a CAI lesson requiring approximately nine hours of study. No differences were found among the experimental conditions in performance of training time, but it was discovered that students who controlled their own programs maintained more favorable attitudes toward CAI. In the light of these findings it would seem that CAI programs can allow for a measure of student control; this, in turn, will make the authoring of CAI programs a less complicated task since the author will not have to be completely responsible for program branching. (Author/LB)

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SUMMARY

Objectives:

The research was designed to compare student controlled to program controlled CAI for individualizing training and to evaluate the effect of reading a lesson narrative before training.

Theoretical frame work:

Previous CAI research has demonstrated the superiority of program controlled branching over fixed sequence CAI training. Program controlled branching allowed fast students to complete training four to 12 times more quickly than slow students. Although program controlled branching yields highly individualized CAI, the development of course materials using this strategy requires much time and effort on the part of skilled and sophisticated lesson authors. Program controlled CAI course materials are therefore expensive to develop.

Student controlled CAI strategies may offer a technique for simplifying CAI course development, if it can be demonstrated that students can select their own training content and control the amount of training they receive without degrading achievement or training time. Student controlled branching requires the student to make his own branching decisions; the strategy assumes that the student is an adequate judge of what he does and does not know and that he will select the amount of training he needs for learning.

Methods:

Design. A 2 x 2 factorial design was used to investigate the influence of two pretraining and two training conditions on performance scores and training time. The two pretraining conditions were: A narrative read before each CAI lesson and a non-narrative control condition. The two training conditions were student controlled and program controlled branching.

Subjects. The subjects were 96 Navy trainees in the Basic Electricity/Electronics School, Service School Command, Navy Training Center, San Diego, ready to begin instruction on AC Series Circuits and Resonance. The students were randomly assigned among the four experimental conditions to give an n of 24 per cell.

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Equipment. The CAI system was an IBM 1500; each student terminal had a CRT display, keyboard, lightpen, and image projector.

CAI training materials. A previously tested and evaluated CAI course module developed to replace a week (30 hours) of classroom instruction in AC Series Circuits and Resonance was redesigned to provide a student controlled and a program controlled version of each lesson. The revision task involved constructing separate and independent training sequences for each lesson training objective. The student controlled and program controlled designs used identical training sequences for each lesson training objective. The only difference in the lesson versions was how a student got to the training sequence. In the student controlled version a student chose his training topics from an index; in the program controlled version a student was automatically branched to a topic if he failed to pass a pretest over the topic or objective or if he elected to bypass the pretest and go directly to the training. A narrative text was also prepared for each CAI lesson. Each narrative was capable of providing "stand alone" training over all lesson objectives, i.e., with sufficient study of the narrative the average student could pass the lesson test with a perfect score. Each CAI lesson ended with a test over all major lesson objectives. At the completion of a lesson test a student automatically received this test score and a feedback explanation over each missed item.

Procedure. Students were told that the training would take two to four days. Each was assigned to a carrel and signed on to an introductory lesson which taught him how to use the terminal and acquainted him with the general format of the CAI lessons. Students in the narrative condition were instructed to read the lesson narrative completely through before starting a lesson and to not refer to the narrative after beginning the lesson. After the introductory lesson, students proceeded through the training lessons at their own pace. They took a lesson test at the end of each lesson. When a student completed all training, he was given the School's final examination and an attitude questionnaire.

Data source:

Lesson training times, lesson test scores, and total training times were automatically collected for each student in his performance record by the computer. Final examination scores and questionnaire data were hand scored. Background data on trainees were obtained from school records as well as previous school examination scores and training times.

Results and conclusions

Final examination scores for the four experimental conditions ranged between 82.5 and 85.5 % correct and were not significantly different when tested with a covariant analysis of variance in which previous school performance was the covariant. Total training time (actual terminal time) ranged from 9 hours 18 minutes to 9 hours 54 minutes and was not statistically different for the four conditions. Lesson times and lesson scores

showed few differences between conditions; where differences were statistically significant the trends were not consistent.

Students in the narrative condition indicated that they felt the narratives were a valuable aid. Students in the student controlled conditions rated CAI significantly higher than students in the program controlled conditions.

The results of the study appear to indicate that student controlled and program controlled CAI are equally effective. Reading a lesson narrative does not appear to contribute to either lesson or final examination achievement nor training times. No explanation is readily available to explain why reading a narrative before training did not aid in shortening training time or enhancing performance in either of the two training conditions. Students may not have spent sufficient time reading and studying the narratives before beginning the lessons. Generalizing from the data, there is reason to recommend the liberal use of student controlled branching in CAI training and also the use of a narrative overview to acquaint the student with the subject matter and topics on which he will receive training.

Educational importance of study:

The advantage of using student controlled strategies is that the burden of control is removed from the shoulders of the CAI author. He can devote less time to deciding how, when, and if a student should receive each bit of his training. This savings in time can be diverted into making content more adequate or accurate or into completing lessons more quickly. Students indicate that they like to make their own decisions about their training. Maintaining high positive attitude levels may be very important during long and extended training periods.

More research is necessary to determine the reliability and consistency of the present findings. Time spent reading a narrative before starting training may be important. Training content, as well as other student variables, may influence the effectiveness of student controlled CAI training.

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